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THE USSR RECORD IN SOVIET ECONOMIC GROWTH

INDUSTRIAL PRODUCTION IN THE USSR

October 1962

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INDUSTRIAL PRODUCTION IN THE USSR

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I. Introduction

Industry is the highest priority producing sector in the Soviet economy. Indeed, industrial production is not only a means to other ends as in any economy but is an end in itself. The continuing rapid growth of industry is a political requirement in the Soviet Union exceeded in importance only by military preparedness. The best trained and highest quality manpower as well as a large and rapidly growing share of investment are annually directed into industry and in particular into heavy industry whose principal end products are (1) armaments, and (2) machinery and construction materials for more investment and more industrial capacity. Under these conditions it is not surprising that industrial capacity and production have grown rapidly.

The purpose of this paper is twofold: (1) to present an independently constructed index of civilian (non-armaments) industrial production for the USSR for the period 1950 to 1961, and (2) to consider possible trends and recent developments in over-all industrial production, including armaments. In an effort to make the civilian index as representative of postwar production as possible, the sample of physical products, whose production is regularly announced by the Soviet government, has been supplemented by estimated production series for a number of new and rapidly growing products. The most important of these are electronics production, civil aircraft, and merchant ships.

A number of other possibly fast growing products are omitted for lack of data. On this account the calculated index may still somewhat understate actual growth of civilian industrial production. A more detailed description and evaluation of the index can be found in the appendix to the paper.

II. Soviet Industrial Production from 1950 to 1961

A. Recent Trends in Civilian Industrial Production

Civilian industrial production in the USSR has grown rapidly in the period 1950 to 1961, but the growth has slowed somewhat since 1955 and especially in 1960 and 1961. According to the calculated index the average annual growth from 1950 to 1955 was 10.1 percent, from 1955 to 1961, 8.7 percent and for 1960 and 1961, 6.6 percent. The index and its components are shown in Table 1 and Chart 1.

Both industrial materials and consumers non-durable goods show fairly rapid rates of growth during the 1950's followed by a moderate slowing down in 1960 and 1961. For industrial materials the average annual growth was 10.0 percent from 1950 to 1959 and 6.0 percent from 1959 to 1961. The growth rates for consumer non-durable goods for the same periods are 8.8 percent and 4.6 percent. In civilian machinery production the retardation starts abruptly in 1958 and is more pronounced than in the other two components. Civilian machinery maintained an average rate of growth of 16.4 percent from 1952 to 1957, but since 1957, only 8.7 percent.

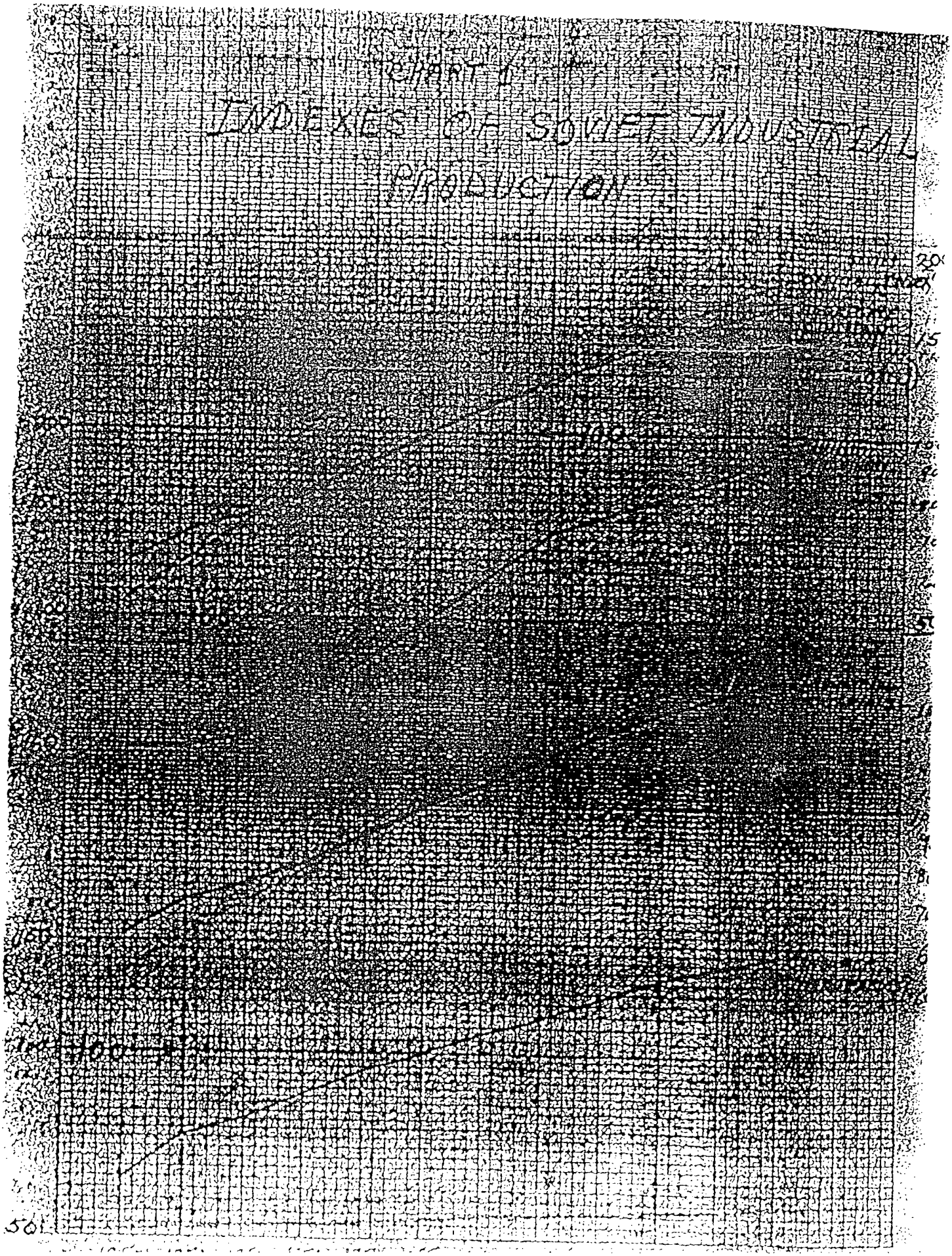
B. Over-all Industrial Production

The addition of arms production to civilian industrial production would surely modify the calculated trends. In the absence of armaments production data the degree of slowdown in over-all Soviet industrial production is uncertain, but we do not believe its inclusion would eliminate the slowdown. The Soviet official index, shown in Table 1 and Chart 1, which presumably includes armaments production, shows a slight slowdown in 1960 and 1961.

The growth of armaments cannot be estimated with confidence, but some speculations are in order. The general shape of the trend in armaments and the key dates in Soviet military procurement policy can be readily guessed at. It is of special interest that the armaments production trend appears to have different turning points than those in the trend of civilian production. The useful statistics for this purpose are civilian machinery production, excluding electronics, and metals production (Greenslade-Wallace indexes). These are shown on Chart 2. 1/

The impact of armaments production is clearly visible in the Korean War period. While metals production rose steadily through 1950, 1951, and 1952, civilian machinery stayed constant. Civilian machinery resumed a rapid growth in 1953 which continued until 1957. Following 1957, civilian machinery grew even more slowly than metals production. By analogy with the Korean War period, the evidence since 1957 suggests an acceleration of arms production. The general shape of an arms production index can be described as follows: a rapid growth

1/ See Appendix C.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PRODUCTION

from 1950 through 1952; a flat or slowly growing trend through 1957; acceleration after 1957. We cannot say what quantities to substitute for the words rapid, slow, and accelerate but any of several reasonable guesses have the same modifying effect on civilian production trends -- that is, to increase the growth trend in 1950-52, to slow it down in 1953-1957, and perhaps to increase it since 1957. Hence retardation in industrial growth may have occurred after 1952 and again after 1959. An illustrative trend in over-all industrial production thus might be: 1950-1952, an annual average growth of 11 percent; 1952-1959, 9-9 1/2 percent; and 1959-1961, 7-8 percent.2/ In this view 1950-1952 represented a continuation of the postwar recovery surge and the recent slowing down occurred primarily in 1960 and 1961.

C. Possible Reasons for the Recent Retardation in Industrial Growth

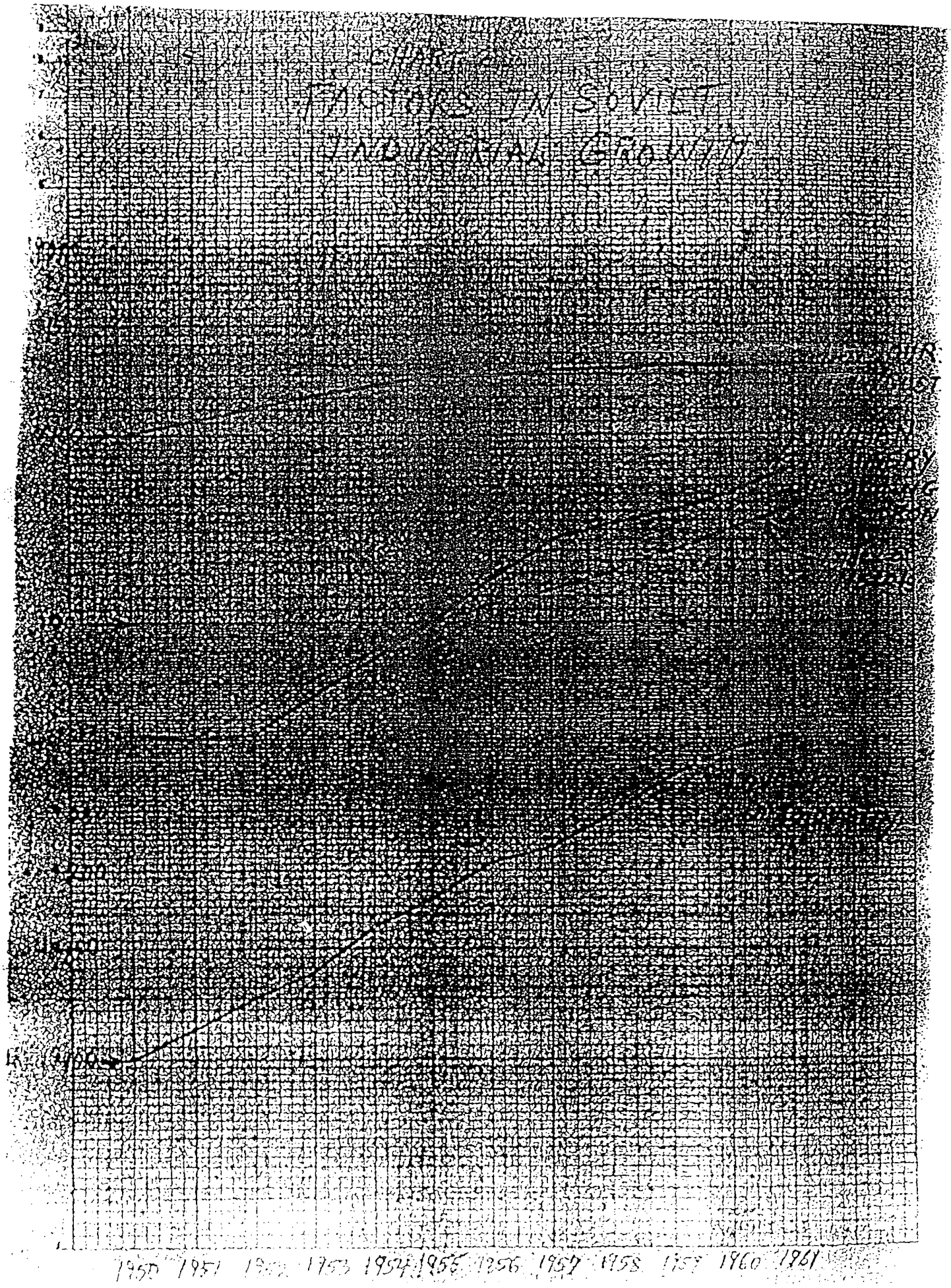
Two factors stand out as possible causes of the recent retardation: first, the reduction of the scheduled workweek from ~~57~~ 47 to 41 hours in the period 1958-60, and the trend of labor supply generally; second, the slowing down of investment as a result of an increase of military production. The trend of man-hours

2/ For the over-all index to be raised from ~~6.7~~ 6.6 percent annually to 8 percent in 1960 and 1961 would require a non-electronics armaments growth of 14 percent annually. To raise it to 9 percent, and eliminate retardation entirely would require armaments growth of 20 percent annually. The latter figure seems unreasonably high. It would surely have produced a greater effect on the rest of the economy than we observe.

worked in industry is shown on Chart 2 along with investment in industry.3/ The trend in industrial investment shows only a slight slowing down, mainly in 1961. It appears that the increase in arms production has come chiefly at the expense of investment in sectors other than industry. Shortfalls in industrial investment in 1960 may have had some retarding effect on production in 1961. Investment in 1961 would have its effect mainly in 1962.

The trend in man-hours, in contrast, shows a marked flattening out after 1957, which is, of course, closely related to the progressive introduction of the short week from 1957 through 1960. The flattening of growth of man-hours worked surely has had some retarding effect on output. Very possibly, however, this effect was postponed until 1960 and 1961 as a result of the scheduling policy in the introduction of the short workweek. In 1958 and 1959 each enterprise was instructed to introduce the short week if it could do so without increasing its labor force and without reducing output below plan. Those enterprises that did introduce the shorter week in 1958-59 presumably had at hand known labor-saving opportunities. Taking advantage of these opportunities in a given year means not having them in later years. In 1960 all industrial enterprises shifted to the short workweek, ready or not. The Soviet press testifies to the fact that many of these enterprises were forced to hire more workers. The industrial statistics in Table 1 reveal at least one industry that

3/ See Appendix C.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Indexes of Soviet Indust
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Calculated index	1955 Value-Added Weights	1950	1951	1952
Industrial materials	52.3	61.5	69.9	75.3
Electric power	3.3	54.0	61.5	70.4
Coal	9.3	66.9	72.5	77.2
Petroleum products & natural gas	2.4	53.3	59.5	66.5
Ferrous metals	6.0	59.1	68.0	75.9
Nonferrous metals	4.8	51.5	60.2	70.7
Forest products	14.2	75.7	85.8	85.9
Paper products	0.8	62.2	69.7	77.1
Construction materials	6.8	45.8	54.3	62.6
Chemicals	4.7	53.1	62.6	70.2
Civilian machinery	22.2	61.8	61.9	64.3
Machinery, excl. electronics	19.5	66.1	65.0	66.2
Electronics	2.7	31.2	40.4	50.5
Consumer nondurables goods	25.5	62.2	73.2	78.1
Soft goods	16.2	61.8	74.0	77.6
Processed food	9.3	63.0	72.0	78.9
Aggregate civilian industrial production	100.0	61.7	69.0	73.6
Official Soviet index of the gross value of industrial production		54	63	70

suffered a drop in output attributable to the reduced workweek. The timber industry, operating in distant and unattractive locations, has always had trouble maintaining its labor force in spite of premium wages. The introduction of the 41-hour week simply resulted in 7 1/2 percent drop in output of forest products from 1959 to 1961.

A third factor which may have had some retarding effect on civilian machinery production is the effort to introduce greater diversification in product lines. Introduction of new technology in industrial production processes has been a vital part of industrial growth in the Soviet Union. But final products have usually consisted of a limited number of standard models. Product differentiation and diversification have never been strong points of Soviet industry outside of high priority fields such as armaments. In this respect the emphasis of the seven year plan on new technology along with the bonuses for its introduction may have led some enterprise managers down unfamiliar and unproductive paths. Difficulties in designing and tooling up for a wider model range have been reported in agricultural equipment production especially, and it is possible that these difficulties are in part responsible for the decline in output of agricultural equipment from 1957 to 1959.

It seems likely that competition from military demand contributed to difficulties in the introduction of new types of civilian equipment as well as in other aspects of new technology for civilian purposes. In this connection

armaments should be thought of as including atomic energy activity and space programs. Space, and nuclear weapons and missiles, in this country as well as in the USSR, have introduced a quality aspect into the competition for resources that may be as important as the quantitative aspect. It is characteristic of recent trends in weapons systems and space programs that the research, development, and testing programs have become an increasingly large part of cost. More important, the resources required for these programs are specialized and scarce -- very high grade scientific, engineering, and technical manpower are required along with special alloys and chemicals, low tolerances, high performance, and in many cases handmade components. Each rocket test firing wipes out a gleaming and outrageously expensive package of hardware. The high grade resources are just those most needed for the Soviet plans for new technology (labor saving and capital saving) in both industry and agriculture.

III. A Comparison with Western Countries.

Table 2 compares industrial growth for the USSR, US, Japan, Federal Republic of Germany, France, and Italy.

The most startling numbers in Table 2 are those for postwar Japan. Its recent rate of growth not only far exceeds that of any European countries, but also that of the USSR from 1928 to 1937. In the rapid surge of the first two five-year plans Soviet civilian industry grew 11.2 percent annually according to Nutter 4/ and 10.6 percent according to Kaplan and Moorsteen. 5/ The growth

4/ The Growth of Industrial Production in the Soviet Union, G. Warren Nutter, Princeton University Press, 1962, p. 163.

5/ Indexes of Soviet Industrial Output, Norman M. Kaplan and Richard H. Moorsteen, Rand Corporation, 1960, p. 266.

Table 2

Average Annual Growth of Industrial Production

Percent

Period	USSR	US	Japan a/	Federal Republic of Germany b/	France b/	Italy b/
Prewar to 1961	5.9 c/	4.3 c/ 4.5 d/	5.3 c/	4.0 e/	4.0 e/	5.3 e/
1950-55	10.1	5.2	15.5	12.3	5.5	8.9
1955-61	8.7	2.1	18.2	6.6	7.0	9.0
1950-61	9.3	3.5	17.0	9.2	6.4	8.9

a. Japanese Statistical Yearbook, 1961 and Japanese Economic Statistics, no. 46, July 1962.
b. Source OEEC, Industrial Statistics, 1900-1959, and OECD, General Statistics, July 1962.
c. Initial year 1937.
d. Initial year 1940.
e. Initial year 1938.

of Soviet industry in the postwar period is about the same as that of Germany and Italy, greater than that of France, and considerably greater than that of the US.

Caution is desirable in drawing conclusions from short periods of growth, particularly in countries recovering from wartime destruction. Therefore, average annual growth since prewar is shown for each of the countries. For this purpose we have linked our calculated index for the USSR for 1950-1961 to the Kaplan-Moorsteen index of civilian output 6/ for 1937-1950.

In capability for making industry grow, the USSR must be given high marks.

6/ Ibid.

The USSR [illegible] industrial level than [illegible] Japan. Each of the countries except the [illegible] significant [illegible] aid in its recovery effort, but the USSR's [illegible] receipts from the European satellites are smaller relative to its size than the foreign investment in the West European countries and Japan. 7/ Furthermore, West Germany, Italy, and Japan have not simultaneously borne a heavy defense burden while carrying on their postwar industrial growth. Finally, it should be noted that the US and France had a great deal of unemployed labor and plant capacity in the prewar base years.

The USSR growth rates in Table 2 represent civilian industrial production. Before drawing final conclusions about the international comparisons in the table we must consider the possible effect of armaments production on the USSR industrial growth rates.

There does not appear to be any better approach to military procurement than that developed by Professor Abram Bergson 8/ in his studies of Soviet national income. For the postwar period his procedure is essentially to arrive at military [illegible] by subtracting personnel pay and subsistence

7/ Since [illegible] War II the [illegible] acquired reparations and war booty estimated at [illegible] billion dollars or a little more. See External Impact of Soviet Economic Power, Penelope Thunberg, paper contributed to J.E.C., Oct 1962. Total US government and direct private investment in the three Western countries and Japan from 1946-1961 is as follows in billions of dollars; France, 5.86; West Germany, [illegible] Italy [illegible] Japan, [illegible] See US Agency for International Development, US Foreign [illegible] Department of Commerce, Survey of [illegible] Since the [illegible] during this period has been almost [illegible] the advantage in outside aid [illegible]

8/ [illegible] Abram Bergson, [illegible]

from the announced defense budget. Uncertainties about number of men in service, their average pay, and prices paid for subsistence goods combine to make this a precarious operation. In addition, the announced defense budget is itself under suspicion. There are reasons for believing that activities such as military research, development, and testing, and perhaps even some part of armaments procurement are financed from other parts of the budget. These kinds of activities have certainly been growing rapidly since 1950 as defense weapons policy has shifted more and more to nuclear weapons and missile systems. 9/ While this increases the uncertainty, it suggests that Bergson's method leads to a conservative estimate of the growth of armaments.

Bergson explicitly estimates munitions procurement for 1940 to 1955, and the estimate can be extended back to 1937 to obtain an index of 415 for the period 1937 to 1955. 10/ This over-all growth is already greater than the estimated civilian production growth of 395 percent for the entire period 1937 to 1961. 11/

These calculations strongly suggest that the growth of armaments production from 1937 to 1961 exceeded the growth of civilian industrial production and that

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9/ In this matter we follow the argument in The Claim of the Soviet Military Establishment on Economic Resources, by John G. Godaire, paper contributed to JEC, Oct 1962.

10/ Bergson's estimate of total procurement for 1937 is divided between munitions and other procurement by the 1940 ratio of the two. See Bergson, op.cit., (6, abc p. 366.

11/ The Kaplan-Moorsteen index of 148 for 1937 to 1950 times the Greenslade-Wallace index of 267 for 1950 to 1961.

the latter is a minimum measure of Soviet industrial growth, 12/ and finally that if the Western European and Japanese postwar industrial recoveries have been impressive, that of the USSR has been no less so.

12/ A much smaller estimate of Soviet armaments production growth from 1937 to 1955 has been calculated by Professor G. Warren Nutter. See Nutter, op.cit., p. 322 This estimate appears to be a serious understatement. In the first place, we can be reasonably sure that the stock of armaments has grown faster than number of men in the armed forces over this period. The trend toward increasing firepower and equipment per man seems incontestable. The annual flow of armaments production would also increase faster than number of men, as long as there is no unusual contraction in the terminal period.

The number of men in the Soviet armed forces since 1937 was approximately as follows in millions:

1937	1950	1951	1952	1953	1954	1955
1.5-1.7	4.0	4.9	5.8	5.8	5.8	5.5

See Bergson, op.cit., p. 366.

An index of military manpower from 1937 to 1955 is considerably slower than Bergson's carefully calculated munitions index. The manpower index, Bergson's munition index, and Nutter's military products index are as follows:

	1937	1950	1955
Manpower	100	235-267	324-367
Bergson, munitions	100	266	415
Nutter, military products	100	103	288

Nutter's estimate, implying that armaments production per man fell drastically from 1937 to 1950 and from 1937 to 1955, seems to us implausible. Nutter's calculations involve dividing the defense budget in current rubles into pay and subsistence and procurement, and then dividing procurement into military products and "all other". From 1937 to 1950, according to Nutter's calculations military products rise (in current rubles) 57 percent and "all other" rises 13-fold, from 21 percent of all procurement to 69 percent. From 1950 to 1955 "all other" is held constant by Nutter and military products rise rapidly from 31 percent of all procurement to 54 percent. The rationale of these diverse shifts escapes us. Even though Nutter's trend of armaments for the whole period 1937 to 1955 is too low, the trend from 1950 to 1955 appears to us too high because of the exceptionally low index for 1950.

Industrial growth per se, however, is not a measure of industrial efficiency or of efficiency in promoting growth, much less of the effectiveness of an economic system. Where efficiency is in question the industrial performance must be related to cost -- cost in terms of the opportunities foregone in other parts of aspects of the economy and in terms of the cost of inputs into industry. We are already familiar with the cost to Russian consumers of the tremendous communist emphasis on industrial investment and growth. Careful comparative studies of relative efficiency of industrial growth as between various countries at various levels of technology have yet to be made. In this paper our concern is only with industrial growth from the point of view of its strategic implications for the US over the long run. 13/

IV. Comparison with Other Indexes of Soviet Industrial Production

Precisely what has been the postwar growth of Soviet industrial production is still a controversial matter in spite of substantial efforts by Western economists. The index of gross value of industrial production published by the

13/ As a matter of general interest we can calculate absolute increases of industry in the US and USSR. This calculation must consider the divergence in Western estimates of the relative size of US and USSR industry in any base year. Two main estimates have been published. The estimate of Nutter is that USSR industry equals 22 percent of that US in 1955. (3, above) See Nutter, op.cit., p. 238. Mr. Allen Dulles' estimate implies that USSR industry was 1/3 of US in 1955. If Dulles is correct, the Soviet absolute increase from 1955 to 1961 was 22 (US in 1955 equals 100) and the increase in US industry over the same period was 13. If Nutter is correct, the Soviet increase was 13 1/2 against the US increase of 13. Hearings before the Joint Economic Committee Congress of the United States, 13 November 1959, statement of Allen W. Dulles, p. 1.

USSR itself is not accepted by Western students as an accurate measure of industrial growth. The specific faults of the Soviet gross value index -- large and probably varying doublecounting, excessive pricing of new products, inclusion of non-productive activity such as capital repair -- have been exhaustively analyzed by many Western writers and need not be rehearsed here. 14/ But perhaps the most important consideration is the inflated reporting arising from the tremendous political pressure and financial incentives operating at all levels of the industrial hierarchy to make the gross value index for each plant, each region, each industry, and the economy as a whole rise in excess of plan.

Two comprehensive indexes of Soviet industrial growth have been constructed recently; one by Norman Kaplan and Richard Moorsteen to a terminal year of 1958, the other by G. Warren Nutter to 1955. For the prewar period these exhaustive and careful studies give results which are substantially in agreement for civilian industrial production and there is small likelihood that they could be much improved on with present data. For the postwar period, however, there are considerable doubts about the representativeness of the sample of products used in the two indexes.

The postwar period both in the US and the USSR has been one of rapid introduction of new products and of rapid development of new industries. In

14/ See Francis Seton in Soviet Studies, October 1960, pp. 128-130.

the successive revisions of the FRB index new industries and products have been intensively covered. In the list of commodities for which the Soviet government releases production data new products are usually among the missing. The omissions are principally but not entirely in the coverage of machinery and equipment production. Kaplan and Moorsteen commented on their postwar index in the following words: 15/

> "With the beginning of the 1950's, however, the level of technical sophistication in Soviet machinebuilding rose rapidly. The number of models proliferated and changed frequently. Thus, the machinery index is believed significantly to understate the actual increase in output from 1950 on."

The principal difference between the calculated index in this paper and other Western constructed indexes of Soviet industrial output is the inclusion in the former of estimates for new industries and products, especially electronics output, civil aircraft, and merchant ships. Military purchases of merchant ships and transport aircraft are excluded (for lack of data), but the production series for all other industries are comprehensive and include production destined for military as well as civilian use. Important examples of dual use are trucks, automobiles, tractors, and electronics. Since armaments production as such is omitted, however, the calculated index is referred to as an index of civilian industrial production.

15/ Kaplan-Moorsteen, op. cit., (8, above), p. 54.

Table 3

Three Indexes of Soviet Civilian Industrial Production, 1950-55
1950=100

		Greenslade-Wallace	Nutter	Kaplan-Moorsteen
I.	Industrial Materials	162.7	154	160.1
	Ferrous a/	169.2	170	167.9
	Nonferrous b/	194.0	187	--
	Fuel and electricity	161.6	158	--
	Electricity	185.2	--	186.6
	Fuels	156.0	--	167.2
	Chemicals (including paper)	183.8	144	--
	Chemicals c/	188.4	--	165.3
	Paper	160.7	--	--
	Construction materials (incl. wood)	151.5	150	--
	Construction materials	218.5	--	190.4
	Forest products	132.0	--	--
	Lumber, wood, and paper d/	133.4	--	139.1
II.	Civilian Machinery (excluding consumers durables)	147.7	--	--
	Machinery (excluding electronics, aircraft, and ships)	134.0	125	136.2
Indent	Transport equipment e/	108.7 e	106 e	118.2
Indent	Agricultural machinery f/	133.3 e	128 e	122.6
Indent	Miscellaneous machinery g/	162.4 e	154 e	169.3
	Added sectors			
	Electronics h/ (excl. radios and TV's)	295.4	--	--
	Civilian aircraft	326.9	--	--
	Civilian shipbuilding	192.6	--	--
III.	Consumer Goods	172.1	161	170.3
	Food and allied products	158.8	154	156.7
	Non-foods	179.1	--	178.9
	Textile and allied products	161.7	154	--
	Consumer durables (incl. radio and TV) i/	344.8	283	--
IV.	Total Civilian Industrial Production	162.1	[illegible]	158.1

a. [illegible] only in the Greenslade-Wallace index. Both Nutter and Kaplan-Moorsteen include iron ore, pig iron, steel ingots and castings, and rolled products.

b. Aluminum is included in the Greenslade-Wallace index but not in the [illegible].

c. Plastics and synthetic fiber in the Greenslade-Wallace index but not in the other two indexes. Nutter's sample of chemicals is considerably smaller than in the other two indexes.

d. For the Greenslade-Wallace index, lumber, wood and paper, which are part of the preceding category, are shown again in order to match the different classification of the Kaplan-Moorsteen index.

e. In all indexes includes automotive and railroad equipment.

f. In all indexes includes tractors and agricultural equipment.

g. Metallurgical, chemical, and petroleum refining equipment are omitted from the Nutter index. The disaggregation of the Kaplan-Moorsteen machinery index is taken from Prices and Production Of Machinery in the Soviet Union 1928-1958, Richard Moorsteen, Harvard University Press, Cambridge 1962, pp. 312-313, 382-391.

h. Excludes civilian radios and television sets in all indexes. Both Nutter and Kaplan-Moorsteen include a few electronic items in miscellaneous machinery -- chiefly telephones and switchboards.

i. Nutter omits television sets, a very important and fast growing product in the consumer durable category.

As in other Western indexes major sectors of industry are aggregated by weights that are intended to approximate value added.

A comparison of our index with the Nutter and Kaplan-Moorsteen indexes for the period 1950-1955 is presented in Table 3. The most important differences in coverage between the three indexes are noted in the footnotes to Table 3. The rate of growth of our index exceeds the rates for both the Nutter and Kaplan-Moorsteen indexes for the period 1950-1955. The comparison in Table 3 makes clear that the largest part of the difference between our index and the other two is accounted for by added coverage of ours. In particular the widest divergence is in the machinery sector, and this divergence stems primarily from the addition of electronics, civil aircraft, and shipbuilding to our index. 16/ The divergence of our index from Nutter's stems also in part from a significant difference in weights for the major sectors. Nutter's weight for machinery is 29.1 percent whereas our weight for machinery excluding electronics is 19.5 percent. Nutter does not reduce the machinery weight to exclude arms production and applies this large weight to his very slow-moving machinery index.

In spite of the broader coverage the present index grows only a little faster than the Kaplan-Moorsteen index in the 1950-1955 period. Industrial materials and consumer's goods account for about 80 percent of the weight in both indexes, while the principal divergence of component indexes for 1950-1955 is the machinery sector. Thus one would not expect the over-all civilian

16/ A comparison of the calculated civilian machinery index with the index of the equipment portion of investment announced by the Soviet Government is given in Appendix B.

indexes to diverge seriously. From 1955 to 1958 the two indexes diverge a little further. For 1958 the Kaplan-Moorsteen index is 128 percent of 1955 for an average annual growth of 8.6 percent; our index is 133.6 or 10.1 percent annually. The Kaplan-Moorsteen index is weighted by 1950 prices, the Greenslade-Wallace index by 1955 prices. One would expect early year prices to result in somewhat faster growth than later year prices, for an identical sample, because of the general tendency of relatively large price declines to be associated with fast-growing items. However, the broader coverage of faster growing items in the Greenslade-Wallace index more than offsets this price factor.

Finally, we take note of the over-all industrial index including armaments computed by Nutter. This index is compounded from Nutter's civilian index which is 146 percent in 1955 compared to 1950 and a military products index of 280. The over-all index is 158 or 9.6 percent per year. This may be very close to the mark as an over-all index of Soviet industrial production in this period. We believe, however, that Nutter's index seriously understates the growth of civilian industrial production and overstates the growth of armaments production, and hence gives a misleading picture of the structure of industrial growth in this period. 17/

V. Future Prospects for Industrial Growth in the USSR

The uncertainty about the rate of over-all industrial production for the past

17/ See footnote 11.

few years, makes forecasting all the more hazardous. Certain generalized conclusions, however, are suggested by the changes in trends over the past decade.

The loss in industrial growth attributable to the reduced workweek is presumably non-recurring. The Soviet government has promised an additional reduction of one hour on Saturdays in 1962, and gradual reduction to a 35-hour workweek beginning in 1964. Whether the one hour reduction has actually been carried out is not yet known. However, any further substantial reduction of the workweek would be a resounding victory of ideology over common sense. Assuming there is no further reduction we can anticipate a resumption of growth of manhours worked in industry, and on this account some reacceleration of growth as compared to 1960 and 1961. Bottleneck problems arising from excess inventory accumulation or specific commodity underfulfillments may have contributed to the slowdown in 1961. These are susceptible to vigorous ad hoc administrative corrective action and on this account also industrial growth in 1962 may be increased over 1961.

A reacceleration of growth over the longer run appears to be closely dependent on allocation decisions yet to be made. From 1952 to 1959 a 9 to 9 1/2 percent average annual growth rate was made possible by a progressive diversion of resources from military growth to civilian uses and especially to industrial investment. The number of men in the armed forces was substantially reduced and

armaments production grew more [illegible] civilian machinery output. Since 1957 this division has probably [illegible]. Diversion to the military since 1957 must have been particularly severe in those resources required for the application and [illegible] of new technology. This is especially important in the light of recent indications that Soviet industry, as it is now constituted, is not very adept at introducing new products, diversification, and quality improvements.

If the Soviet leadership chooses to continue its development and production of new weapons systems and space projects at about the same rate as in the last two or three years, it will have to settle for a more moderate rate of growth in industrial production than in the mid-fifties. Conversely a choice in favor of industrial growth will require a restraining of the growth in military and space expenditures. If, in addition, the leadership should feel compelled to recognize the accumulated demands of consumer sectors such as agriculture and housing, military and space demands will have to be even more severely restrained.

APPENDIX A

DESCRIPTION OF THE INDEXES

I. Sources of Data and Coverage of Sample

The basic sources of data are physical outputs and prices of commodities given in a succession of Soviet statistical handbooks. 18/ Limited space precludes a discussion of these data here. A description of these statistics can be found either in Kaplan and Moorsteen or in Nutter.

For the index calculated in this paper these basic statistics have been extended or disaggregated on the basis of a variety of information in Soviet economic and technical literature. The following outline summarizes the major additions or modifications to the announced physical production sample, which are included in the present calculated index and in most cases were not included in either the Nutter or Kaplan-Moorsteen indexes. 19/

a. Synthetic fibers and plastic resins. Production data for the former have been regularly reported, but for the latter have just recently been released by the Soviets. 20/

b. Non-ferrous metals, especially aluminum. Estimates were based on scattered references to percentage gains for individual metals in the Soviet literature. The series of aluminum production figures has been derived from official announcements of percentage increases in output.

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18. Especially Industry 1957, National Economy 1956, 58, 59, 60, and USSR in Figures, 1961.
19. A detailed report on the indexes in this paper is being prepared for publication elsewhere.
20. Plastics in metric tons was announced by Khrushchev in his 22nd party congress speech in October 1961.

Soviet publications yielded a tonnage figure for 1937 to which percentage increases for the years 1950 and 1954, to 1958 can be linked. Estimates for the years 1951 to 1953 were interpolated. Indexes for the years after 1958 are assumed to be in line with the 1965 planned goal.

c. Disaggregation of machinery categories into models or types. Information in various technical journals has facilitated a few more detailed breakdowns; of tractors into individual models; of diesel and electric locomotives into models. Cars and trucks could not be separated into individual models, although information in technical literature suggests that disaggregation raises the index especially in the case of trucks.

d. Chemical equipment; an announced series in tons to 1954 is linked to an announced series in constant ruble values thereafter.

e. Civil aircraft; almost no production data are available but information concerning the inventory of various kinds of aircraft in Aeroflot at various times has been found. This is supported and supplemented by flight timetables from which inventories can also be deduced from estimated utilization rates. Production series are then estimated from the inventories. The estimates of annual production that result must be quite inaccurate. However, the estimated average rate of production in the second half of the 1950-61 period compared to that in the first half, a 7-fold increase, should be of the right order of magnitude. 21/

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21 We know that Aeroflot, prior to 1955, used 2-engine piston aircraft almost exclusively, and that following 1958 it was in large part re-equipped with jet and turboprop aircraft, and that passenger kilometers flown increased 6 times from 1955 to 1961 and freight ton kilometers, 3 times.

f. Merchant ships -- no comprehensive production information is released, but ships are visible at sea. Not only is an accurate count feasible, but close estimates of size of weight and date of appearance are relatively simple to derive and are compiled by several of the navies and merchant marines of the world regarding each other's shipping. This information on Soviet merchant fleet has been collected by the US Maritime Commission. 22/ The production estimates here are deduced from this inventory information. Because of some uncertainty in individual periods of construction, annual figures may be imprecise, but production trend over several years are quite accurate.

g. Electronics; there can be little question that this industry producing components that are vital to many postwar weapon systems, especially to missile systems and space programs, has been growing rapidly in the Soviet Union from a small base immediately after the war. The Soviets claimed a more than threefold increase in gross value of output from 1950 to 1955. The estimates of value of output of electronics used here are based on announced Soviet number and value of electron tubes and semi-conductors, which in the US has been a fairly constant percent of final output. 23/ The value of Soviet final output is derived from the US ratio of value of shipments of final output to value of tubes and semi-conductors.

Adding imprecise series to an index does not necessarily improve it. With this in mind each new series has been examined for reasonableness in the light of related economic activities. Thus, the rapid growth in production of chemical equipment is consistent with the rapid growth in the

22. US Department of Commerce, Maritime Administration, Merchant Fleets of the World, published twice a year, 30 June and 30 December.

23. Electronics Industries Yearbook, 1962, Electronics Industries Association, Washington, D.C., 1962, p. 2 and p. 54.

production of chemicals. More importantly, in the cases of production of civil aircraft and electronics which significantly raise the entire index, the estimating prodecures or incompleteness of data tend strongly toward conservative estimates. In aircraft several recent models of helicopters are omitted for lack of data. Helicopters, including the world's largest helicopter, have appeared in considerable numbers in the USSR in the last few years and inclusion of these would surely increase the growth of the aircraft series. In 1960 and 1961 the estimated production of passenger aircraft (other than helicopters) declines sharply. New models of aircraft have been heralded in the Soviet literature already but have not been reported as yet in the Aeroflot inventory. Since it is likely that these models already are in production their omission understates production in 1960 and 1961 by an unknown amount.

In the case of electronics the use of a US relationship of value of tubes to value of final output probably understates the Soviet value of final product. In the US civilian radios and TV's, involving small tubes, are a much larger part of the total of electronics production than in the USSR, where military demand for increasingly complex components has been the dominant and the most rapidly growing portion. In combining electronics production with other elements in the machinebuilding sector, the faster-growing electronics has been given only its own value-added weight, assumed to be 1/2 of value of output. Thus, it is implicitly assumed that all machinery products missing from the sample grow at the same rate as non-electronics machinery which grows at a slower rate than electronics.

No armaments production data as such are included. Military purchases of merchant ships and transport aircraft are excluded (for lack of data), but the production series for all other industries are comprehensive and include production destined for military as well as civilian use. Important examples of dual use are trucks, automobiles, tractors, and electronics.

II. Weights

The index is intended to approximate a value-added weighted index such as that of the FRB index. Information for constructing value-added weights is available only for major sectors of industry (those shown in Table 1 [24]). Commodities within major sectors are weighted by prices, retail prices (adjusted to exclude distribution charges) in the case of foods and consumer non-durables and factory wholesale prices for all other commodities. The approximate value-added weights for major sectors are calculated from wage data and estimated depreciation in each sector. Both prices and value-added weights are for the year 1955.

In the absence of value-added weights for individual commodities, an effort has been made to include different products at the highest stage of fabrication and to omit intermediate and lower stages. Thus, rolled steel products are included but steel ingots and pig iron are not. In the machinery sector the items in the sample are almost all final products. Intermediate components such as ball bearings or small electric motors are omitted.

Since armaments are excluded from the index, the value-added weight for machinery [25] has been reduced to reflect only civilian products,

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24. See p. 6.
25. Value added for machinery consists of the wage bill and amortization in the Soviet category "machinebuilding and metalworking".

including electronics. Components are estimated to be approximately half of the final value of machinery output and their value added is assumed to be the same proportion of machinery value added. A further adjustment is applied to reflect the fact that most of electronics output is probably for military uses, for example, radar sets and missile guidance systems. We assume that half of electronics value of output, or .54 billion rubles, is value added in 1955, and of this one-third is civilian and two-thirds military.26/ The value added for civilian machinery, 4.03 billion rubles is reduced by .18 billion rubles to obtain value added for output of non-electronics civilian machinery, 3.85 billion rubles. Of the total non-armaments industrial value-added weight, civilian machinery excluding electronics accounts for 19.5 percent and electronics for 2.7 percent.

XII. Deficiencies of the Index

The major deficiencies of the index are summarized below:

a. As indicated above the sample represents lines of production at one stage only. Hence, as compared to the FRB index it reflects changes in complexity and quality poorly. The much greater level of aggregation in the Soviet index than in the FRB index also results in a poorer reflection of quality changes. Our success in disaggregation of products was quite limited. The calculated series still probably understate Soviet industrial growth to the extent that there has been increasing quality and complexity within aggregate series.

b. The following product classes are not covered or are poorly covered:

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26. All ruble values in this report have been adjusted to new (1961) ruble levels by dividing by 10.

1). Many chemicals end products

2). Non-electonic instruments, metal forming equipment, food processing equipment, and many minor types of equipment

c. The very large category of fabricated metal products other than machinery is unrepresented. This category includes among other things, structural shapes, fencing, nails, screws, nuts and bolts, hand tools, and metal drums, cans, and other containers. This category accounts for 5 percent of value added in the US index and may be large in the Soviet Union also. The official index for metalworking grows only a little faster than that for all industry. 27/ If we can trust the Soviet gross value indexes this far, the omission should not seriously bias the index.

d. Spare parts of all kinds are missing. The Soviets have published a series on the ruble value of spare parts for tractor, agricultural machinery, and automotive equipment. This series rises from .15 billion rubles in 1950 to more than .5 billion in 1957, to .93 billion in 1959. The series rises considerably faster than all industry or even machinebuilding and is a substantial fraction of the value of the latter. However, we do not know enough about the coverage and construction of this series to have much confidence in it. It may represent only production in specialized factories. On the other hand, there is reason to believe that spare parts production has risen rapidly and that its omission from the index results in some understatement.

27. Official index for metalworking for 1955 was 209 (1950 = 100) and for industry 185.

e. Finally, the 1961 production data included in the index are preliminary. The USSR has not yet issued the 1961 volume of National Economy. Hence a number of our series are extrapolated on the basis of indirect indicators or previous trends.

We can not, of course, be sure what the effect of these omissions would be. However, consideration of the omitted products suggests that the calculated index is at least as likely to be understated as overstated on this account.

Armaments, which are specifically excluded, are undoubtedly of sufficient importance to alter significantly the trend of the index. Another missing element is production of hardware for the space program. This activity has graduated from the rare and exotic class into big business, and is perhaps the most rapidly growing activity in Soviet industry since 1955.

APPENDIX B

COMPARISON OF CALCULATED MACHINERY OUTPUT WITH SOVIET ANNOUNCED INVESTMENT IN EQUIPMENT

Since the main divergences and uncertainties of the calculated index center in the machinery field, we would like to find some test of reliability of the machinery series. The announced Soviet index of gross value of production of machinebuilding and metalworking grows even faster than the calculated machinery index, to 500 percent of 1950 in 1961 compared with 311 percent for the calculated index. We cannot, however, distinguish between divergences that arise from difference in coverage (the Soviet index includes armaments as well as other things missing from the calculated index) and those that arise from statistical malpractice in the Soviet index.

The limited coverage of the calculated machinery index is more comparable to the equipment portion of the Soviet investment index. This Soviet index is compared in Table 4 to the producer durables portion of the calculated index, that is, the machinery index of Table 1 minus consumer durables and both with and without electronics.

Table 4

Equipment Portion of Official Soviet Investment Index Compared to Calculated Civilian Machinery Index, With and Without Electronics 1950-1961 (billions of 1955 rubles)

Year	Equipment Portion of Official Soviet Investment Index		Calculated Civilian Machinery Index a/		
	Value	Index	Without Electronics		With Electronics
			Value	Index	Index
1950	3.38	100.0	1.78	100.0	100.0
1951	3.48	103.0	1.70	95.5	97.5
1952	3.69	109.2	1.70	95.5	99.9
1953	3.89	115.1	1.96	110.1	115.9
1954	4.78	141.4	2.18	122.5	129.2
1955	5.64	166.9	2.47	138.8	147.3
1956	6.95	205.6	2.93	164.6	176.2
1957	7.62	225.4	3.40	191.0	206.5
1958	8.85	261.8	3.57	200.6	222.2
1959	9.61	284.3	3.74	210.1	236.8
1960	10.25	303.2	4.02	225.8	257.4
1961	11.00	325.4	4.37	245.5	287.6

a. Excluding consumer durables.

Since electronics includes items for military use, the series including it has too broad a coverage. On the other hand, the calculated series is a sample, while the Soviet index is comprehensive. On account of its coverage of unique items and new products, one would expect it to rise a little faster than the sample series. But in addition it is possible that the Soviet index is overstated on account of pricing of new products

and uncertain reporting. Finally, the investment index should show a time lag behind the production index. Allowing for these uncertainties we conclude the Soviet and calculated index provide some confirmation for each other.

APPENDIX C

Table 5
Data for Chart 2, Factors in Soviet Industrial Growth a/

	Index of Manhours in Industry b/ (1950=100)	Index of Capital Investment in Industry c/ (1950=100)	Index of Combined Metals Production d/ (1955=100)
1950	100	100	55.7
1951	—	112	64.5
1952	—	125	73.6
1953	116	137	81.2
1954	—	162	89.5
1955	124	181	100.0
1956	124	207	107.0
1957	127	218	113.1
1958	128	247	120.1
1959	129	284	129.8
1960	128	314	140.7
1961	129	329	152.6

a. Civilian machinery excluding electronics in Chart 2, from Table 1 of this report.
b. Schroeder, Gertrude, Soviet Industrial Productivity, October 1962. Paper contributed to the Joint Economic Committee.
c. Kapital'noye stroitel'stvo v SSSR, (Capital Construction in the USSR), Moscow, 1961.
d. Derived from data in Table 1 of this report.